Application of Blockchain Technology in Law Library Operations in Selected Academic Law Libraries in North-Central Nigeria: Opportunities, Challenges and Adoption Readiness

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ABSTRACT

This study investigated the application of blockchain technology in law library operations in selected academic law libraries in North-Central Nigeria with emphasis on opportunities, challenges, and adoption readiness. The study adopted a descriptive survey research design using a mixed-methods approach. The population of the study comprised 119 professional and paraprofessional library staff from selected academic law libraries, while 12 library administrators and ICT personnel participated in interview sessions. A total of 87 valid questionnaires were retrieved and analyzed, representing a response rate of 73.1%.

Data were collected using structured questionnaires and interview guides. Descriptive statistics such as frequency counts, percentages, mean, and standard deviation were used to answer the research questions, while regression analysis was used to test the hypotheses at 0.05 level of significance using SPSS version 27.

The findings revealed that blockchain technology can be applied in major areas of law library operations including cataloguing, circulation services, digital archiving, copyright management, and authentication of legal documents. The study further showed that blockchain technology enhances information security, digital preservation, transparency, and operational efficiency in library services. However, major challenges affecting adoption include inadequate ICT infrastructure, poor funding, lack of technical expertise, and erratic power supply. Regression analysis revealed that ICT infrastructure significantly influenced blockchain technology adoption readiness ($\beta = .642$, $p < .001$), while librarians' technological competence ($\beta = .587$, $p < .001$) and institutional support ($\beta = .611$, $p < .001$) significantly predicted blockchain technology adoption in academic law libraries. The study concluded that blockchain technology possesses significant potential for improving security, transparency, digital preservation, and operational efficiency in academic law libraries. The study recommended improved ICT infrastructure, increased funding, institutional support, and continuous staff training to facilitate effective adoption and implementation of blockchain technology in law library operations.

Keywords: Blockchain technology, law library operations, academic law libraries, adoption readiness, ICT infrastructure, digital preservation, Nigeria.

INTRODUCTION

Background of the Study

The rapid advancement of Information and Communication Technology (ICT) has fundamentally transformed the operations, services, and management systems of libraries worldwide. Traditionally, libraries relied heavily on manual procedures such as card cataloguing, physical circulation records, printed indexes, and face-to-face

reference services for information organization and dissemination. However, the emergence of digital technologies has revolutionized the methods through which information is generated, stored, accessed, preserved, and disseminated within contemporary library environments. Academic libraries, including law libraries, now increasingly deploy ICT infrastructures such as integrated library management systems, institutional repositories, electronic databases, digital catalogues, internet-enabled services, and cloud-based information systems to enhance operational efficiency and improve user access to information resources (Krubu & Osawaru, 2011).

The evolution of ICT in libraries began with the automation of traditional housekeeping operations including cataloguing, circulation, acquisition, serials control, indexing, and classification. The development of Online Public Access Catalogues (OPACs), digital repositories, electronic journals, and web-based library services marked a significant transition from conventional library systems to digital and hybrid library environments. ICT has enabled libraries to facilitate remote access to information resources, support virtual learning environments, improve scholarly communication, and strengthen resource-sharing networks among institutions. In Nigerian academic libraries, ICT integration has contributed significantly to modernization efforts by enhancing information accessibility, improving service delivery, and promoting efficient management of library resources despite persistent infrastructural and financial limitations (Krubu & Osawaru, 2011).

The increasing dependence on electronic information resources, digital scholarship, online databases, and open-access publishing has further accelerated the digital transformation of libraries globally. Digital transformation refers to the strategic integration of digital technologies into institutional processes and services to improve organizational efficiency, innovation, and service delivery. In academic law libraries, digital transformation has become particularly critical because legal education, legal research, and legal practice increasingly rely on electronic legal databases, digital archives, institutional repositories, virtual research environments, and online legal information systems. Consequently, law libraries are transitioning from traditional print-dominated systems to digitally driven environments capable of supporting modern legal scholarship and information management (Fagbemi, 2016).

Academic law libraries play a vital role in supporting legal education, legislative research, judicial processes, legal scholarship, and professional legal practice. These specialized libraries manage highly sensitive legal materials including statutes, case laws, legal reports, government publications, treaties, law journals, and electronic legal databases that require efficient organization, authentication, preservation, and secure access mechanisms. The growing digitization of legal information resources has significantly increased concerns relating to information security, copyright protection, digital preservation, authenticity of legal documents, unauthorized modification of records, cyber threats, and data manipulation within digital library systems (Onwubiko, 2025).

Despite the enormous benefits associated with digital transformation in libraries, several challenges continue to affect the management and preservation of digital information resources. Issues such as cyber insecurity, digital piracy, plagiarism, weak authentication systems, copyright infringement, data tampering, and poor digital preservation infrastructure have raised concerns regarding the reliability, transparency, and integrity of digital library operations. These challenges have intensified the search for innovative technologies capable of strengthening information security, improving accountability, enhancing transparency, and ensuring the authenticity of digital records within library environments. One emerging technology that has attracted significant global attention in addressing these concerns is blockchain technology (Yaga et al., 2019).

Blockchain technology is a decentralized and distributed digital ledger system that facilitates secure, transparent, immutable, and tamper-resistant recording and sharing of information across interconnected computer networks. Initially associated with cryptocurrency systems such as Bitcoin, blockchain technology has evolved beyond financial applications into sectors such as healthcare, education, governance, supply chain management, records management, and information systems. Blockchain operates through interconnected blocks of encrypted records that are chronologically linked and validated through network consensus mechanisms, thereby ensuring data integrity, transparency, security, and accountability (Haque & Rahman, 2020). Scholars have described blockchain technology as a transformative innovation capable of reshaping digital information management

systems due to its decentralization, immutability, transparency, traceability, and resistance to unauthorized alterations (Islam et al., 2020).

Within the library environment, blockchain technology has emerged as a promising innovation with the potential to improve various aspects of library operations and service delivery. Blockchain applications in libraries include digital rights management, metadata management, cataloguing systems, circulation management, interlibrary loan services, digital preservation, institutional repositories, scholarly publishing, copyright protection, and authentication of digital information resources. The decentralized architecture and cryptographic security features of blockchain technology provide opportunities for libraries to enhance transparency, improve information security, facilitate efficient resource sharing, reduce data manipulation risks, and establish trustworthy digital preservation systems (Abid, 2021).

The relevance of blockchain technology has become increasingly significant in academic law libraries because legal information requires high levels of confidentiality, authenticity, integrity, reliability, and long-term preservation. Legal information systems demand secure mechanisms capable of preventing unauthorized alterations, ensuring accurate documentation, and maintaining verifiable records for legal research and judicial processes. The increasing digitization of legal materials has exposed academic law libraries to cybersecurity risks, copyright violations, unauthorized access, and manipulation of sensitive legal information resources. Consequently, blockchain technology presents a strategic technological solution capable of strengthening legal information management systems through secure authentication protocols, decentralized access control, and immutable digital record preservation (Sunday et al., 2023).

Recent studies indicate growing awareness and acceptance of blockchain technology among librarians and information professionals in Nigeria. Research has shown that librarians perceive blockchain technology as an innovative tool capable of improving digital archiving, information security, circulation management, scholarly communication, and institutional repository management in academic libraries. However, despite this increasing awareness, the adoption of blockchain technology within Nigerian academic libraries remains relatively low due to several barriers including inadequate ICT infrastructure, poor internet connectivity, insufficient funding, erratic power supply, limited technical expertise, lack of institutional support, and absence of comprehensive implementation policies (Fasola et al., 2024). Furthermore, studies have revealed that institutional readiness, technological competence, staff awareness, and organizational support significantly influence blockchain adoption in library environments.

In North-Central Nigeria, academic law libraries are gradually integrating digital technologies into their operations to improve legal information management and support teaching, learning, and research activities. Nevertheless, many of these libraries continue to experience operational inefficiencies associated with manual and semi-automated systems, particularly in areas such as digital preservation, circulation management, copyright protection, information authentication, and resource-sharing systems. These persistent challenges have created the need for innovative technological solutions capable of enhancing transparency, security, efficiency, and accountability in law library operations. The application of blockchain technology in academic law libraries may therefore provide sustainable solutions for improving legal information management systems and strengthening digital library operations within the region (Makinde et al., 2024).

Although previous studies have examined blockchain technology adoption in academic libraries generally, limited empirical attention has been given to the specific application of blockchain technology in academic law library operations within the Nigerian context, particularly in North-Central Nigeria. Existing studies have largely focused on awareness, perception, and general adoption readiness in academic libraries without adequately addressing the unique operational requirements, technological challenges, and security demands associated with legal information management in law libraries. Therefore, this study investigates the application of blockchain technology in law library operations in selected academic law libraries in North-Central Nigeria with emphasis on opportunities, challenges, and adoption readiness. The study is expected to contribute to the growing body of literature on emerging technologies in library and information science and provide practical insights for improving legal information management systems in Nigerian academic law libraries.

Statement of the Problem

Academic law libraries play an important role in supporting legal education, legal research, and scholarly communication through the provision and management of legal information resources. The integration of Information and Communication Technology (ICT) has improved library operations such as cataloguing, circulation, acquisition, and information retrieval in many academic libraries (Krubu & Osawaru, 2011). However, despite these technological advancements, many academic law libraries in Nigeria, particularly in North-Central Nigeria, still experience operational inefficiencies associated with manual and semi-automated systems. Challenges such as slow service delivery, duplication of records, poor digital preservation practices, and inadequate resource-sharing mechanisms continue to affect effective law library operations (Makinde et al., 2024).

In addition, the increasing digitization of legal information resources has raised serious concerns regarding information security, authenticity, confidentiality, and long-term preservation. Academic law libraries face challenges including cyber insecurity, unauthorized access, copyright infringement, data manipulation, and weak authentication systems, which threaten the reliability and integrity of legal information resources (Yaga et al., 2019). Existing security measures in many law libraries appear inadequate to ensure secure management and preservation of sensitive legal materials.

Blockchain technology has emerged as an innovative technology capable of enhancing transparency, security, accountability, and data integrity in digital information systems (Haque & Rahman, 2020). In libraries, blockchain technology has the potential to improve digital preservation, copyright management, authentication of records, and secure information sharing (Abid, 2021). Despite these benefits, the adoption of blockchain technology in Nigerian academic libraries remains limited due to inadequate ICT infrastructure, poor funding, lack of technical expertise, and limited institutional support (Fasola et al., 2024).

Although studies have examined blockchain technology adoption in academic libraries, limited attention has been given to its application in academic law library operations in Nigeria, particularly in North-Central Nigeria. Therefore, this study investigates the application of blockchain technology in law library operations in selected academic law libraries in North-Central Nigeria with emphasis on opportunities, challenges, and adoption readiness.

Objectives of the Study

General Objective

The main objective of this study is to investigate the application of blockchain technology in law library operations in selected academic law libraries in North-Central Nigeria.

Specific Objectives

The study seeks to:

1. identify the areas of law library operations where blockchain technology can be applied in selected academic law libraries in North-Central Nigeria;
2. examine the opportunities associated with the application of blockchain technology in law library operations;
3. determine the challenges affecting the adoption of blockchain technology in academic law libraries; and
4. assess the adoption readiness of academic law libraries toward the implementation of blockchain technology.

Research Questions

The following research questions will guide the study:

1. In what areas of law library operations can blockchain technology be applied in selected academic law libraries in North-Central Nigeria?

2. What opportunities are associated with the application of blockchain technology in law library operations?

3. What challenges affect the adoption of blockchain technology in academic law libraries?

4. What is the level of adoption readiness of academic law libraries toward blockchain technology implementation?

Research Hypotheses

The following hypotheses will be tested at 0.05 level of significance:

1. H01: There is no significant relationship between ICT infrastructure and adoption readiness for blockchain technology in academic law libraries in North-Central Nigeria.

2. H02: There is no significant relationship between librarians' technological competence and blockchain technology adoption in academic law libraries in North-Central Nigeria.

3. H03: Institutional support does not significantly influence the adoption of blockchain technology in academic law libraries in North-Central Nigeria.

Significance of the Study

This study will be significant to librarians, library administrators, academic institutions, policymakers, researchers, and other stakeholders in the library and information science profession. The findings of the study will provide empirical evidence on the application of blockchain technology in law library operations, particularly in academic law libraries in North-Central Nigeria.

The study will benefit law librarians by providing insights into the potential areas where blockchain technology can be applied to improve cataloguing, circulation, digital preservation, copyright management, and information security. It will also enhance librarians' understanding of emerging technologies and their relevance to modern law library operations. Library administrators and academic institutions will benefit from the study through the identification of opportunities and challenges associated with blockchain technology adoption. The findings may assist institutional management in developing policies, strategic plans, and investment decisions relating to ICT infrastructure and technological innovation in libraries.

The study will also be useful to policymakers and professional bodies in the education and library sectors by providing information that can support policy formulation and implementation regarding the integration of blockchain technology into academic library systems in Nigeria.

Furthermore, the study will contribute to existing literature on blockchain technology and library operations by expanding scholarly discussions on emerging technologies in academic law libraries. It will serve as a reference source for future researchers interested in blockchain technology, digital libraries, legal information management, and technology adoption in libraries. Finally, the study is expected to contribute to improved service delivery, enhanced information security, transparency, and efficiency in law library operations through the adoption of innovative technological solutions.

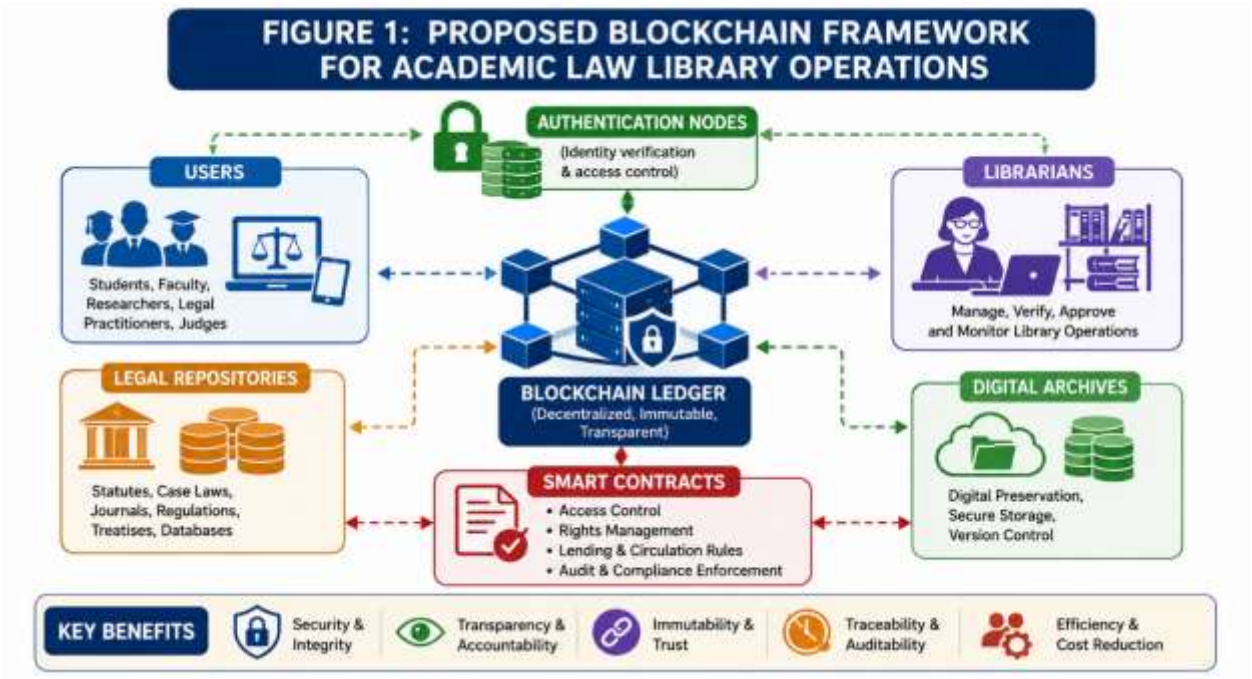
LITERATURE REVIEW

Conceptual Review

Blockchain technology is a decentralized and distributed digital ledger system that enables secure recording, storage, and sharing of information across interconnected networks without the need for a central authority (Yaga et al., 2019). The technology was initially developed for cryptocurrency transactions but has expanded into

sectors such as healthcare, education, governance, finance, and information management due to its transparency, immutability, and security features (Haque & Rahman, 2020). In library environments, blockchain technology is increasingly recognized as a tool capable of improving digital preservation, authentication of records, copyright management, and secure information sharing (Abid, 2021). Key features of blockchain technology include decentralization, transparency, immutability, traceability, and enhanced security. Decentralization eliminates dependence on a single controlling authority, while transparency allows authorized participants to verify transactions within the network. Immutability ensures that records stored on the blockchain cannot easily be altered or deleted, thereby improving data integrity and reliability (Islam et al., 2020). Blockchain technology also supports traceability and accountability through permanent transaction histories secured by cryptographic protocols. Blockchain technology exists in different forms including public, private, and consortium blockchains. Public blockchains are open and accessible to all users, private blockchains are restricted to authorized participants, while consortium blockchains are controlled by a group of organizations or institutions (Yaga et al., 2019). In academic library environments, private and consortium blockchains are considered more suitable because they provide controlled access, confidentiality, and institutional security.

Law libraries are specialized information centres established to support legal education, legal research, judicial activities, and legislative processes through the provision of legal information resources. Law library operations involve activities such as cataloguing, circulation, acquisition, indexing, classification, reference services, and digital archiving. Cataloguing involves the systematic organization and description of legal information materials to facilitate easy retrieval and accessibility. Circulation refers to the process of lending, returning, and managing library resources for users. Acquisition involves the selection and procurement of relevant legal information resources such as statutes, law reports, journals, and electronic databases. Archiving focuses on the preservation and long-term management of legal documents and digital records for future access and use (Fagbemi, 2016). The integration of emerging technologies into these operations has become increasingly important in modern law libraries due to the growing demand for secure, accessible, and efficient legal information systems as represented in figure 1.



Theoretical Framework

This study is anchored on the Technology Acceptance Model (TAM) and the Technology–Organization–Environment (TOE) Framework.

The Technology Acceptance Model (TAM), developed by Davis (1989), explains users' acceptance and adoption of technology based on two major constructs: perceived usefulness and perceived ease of use. The model suggests that individuals are more likely to adopt a technology if they perceive it as beneficial and easy

to use. TAM is relevant to this study because it explains librarians' acceptance and readiness toward blockchain technology adoption in law library operations.

The Technology–Organization–Environment (TOE) Framework, developed by Tornatzky and Fleischer (1990), explains technology adoption within organizations based on technological, organizational, and environmental factors. The technological context includes ICT infrastructure and innovation characteristics; the organizational context includes institutional support, financial resources, and staff competence; while the environmental context includes government policies, competition, and external pressure. The TOE framework is suitable for this study because blockchain adoption in academic law libraries depends on institutional readiness, infrastructure, and environmental support systems.

Empirical Review

Several studies have examined blockchain technology and emerging technologies in library operations. Abid (2021) investigated the uses of blockchain technologies in library services and found that blockchain can improve digital rights management, secure scholarly communication, and enhance transparency in library transactions. The study concluded that blockchain technology has the potential to transform digital library operations through secure and decentralized systems. Fasola et al. (2024) examined awareness, acceptance, and readiness to use blockchain technology in Nigerian academic libraries. The study revealed that librarians demonstrated positive perceptions toward blockchain technology; however, adoption readiness remained low due to inadequate ICT infrastructure, poor funding, and limited technical expertise. Sunday et al. (2023) explored blockchain adoption in library services and reported that blockchain technology could improve digital preservation, cataloguing systems, and information security in libraries. The study emphasized the need for institutional support and technological infrastructure for effective implementation. Krubu and Osawaru (2011) examined ICT adoption in Nigerian university libraries and found that ICT integration improved information accessibility and library efficiency despite infrastructural challenges. Their findings highlight the importance of technological innovation in improving library service delivery. Similarly, Onwubiko (2025) observed that blockchain technology could strengthen transparency, accountability, and security in digital library systems. The study further identified poor policy support and inadequate technological infrastructure as major barriers to adoption in developing countries.

Existing studies on blockchain technology in libraries have largely focused on awareness, perception, adoption readiness, and conceptual opportunities rather than actual implementation frameworks or system feasibility assessments. Most empirical investigations within developing countries, particularly Nigeria, remain exploratory and descriptive in nature with limited emphasis on technical architecture, blockchain governance models, cost implications, scalability concerns, or pilot implementation strategies in specialized libraries such as law libraries. Furthermore, comparative evaluations between blockchain systems and alternative digital security technologies remain insufficiently explored in library and information science literature.

Gap in Literature

Although previous studies have examined blockchain technology adoption in academic libraries, limited empirical research exists on blockchain application within academic law libraries in Nigeria. Existing studies are largely conceptual and readiness-based, with minimal attention to implementation feasibility, technical frameworks, governance structures, scalability issues, or cost implications in low-resource library environments. In addition, few studies have integrated Technology Acceptance Model (TAM) and Technology-Organization-Environment (TOE) variables within a comprehensive analytical framework for blockchain adoption in law libraries. In addition, many previous studies concentrated mainly on awareness and perception of blockchain technology without adequately addressing operational opportunities, implementation challenges, and adoption readiness in academic law libraries. There is therefore limited empirical evidence on how blockchain technology can improve cataloguing, circulation, digital preservation, and information security in law library operations.

This study therefore contributes to the literature by examining operational opportunities, institutional readiness, and adoption challenges associated with blockchain technology in academic law libraries in North-Central Nigeria.

METHODOLOGY

Research Design

This study adopted a descriptive survey research design using a mixed-methods approach. The descriptive survey design was considered appropriate because it enables the collection of data from respondents regarding their perceptions, experiences, and readiness toward the application of blockchain technology in law library operations. The mixed-methods approach combined quantitative and qualitative techniques to provide comprehensive data on the opportunities, challenges, and adoption readiness associated with blockchain technology in academic law libraries.

Population of the Study

The population of the study comprised professional and paraprofessional library staff, library administrators, and ICT personnel in selected academic law libraries in North-Central Nigeria. The selected institutions for the study were Ibrahim Badamasi Babangida University and University of Jos.

A total of 119 professional and paraprofessional library staff constituted the quantitative population for the study, while 12 library administrators and ICT personnel participated in the qualitative interview sessions.

Sample and Sampling Technique

The study employed purposive and stratified sampling techniques. Purposive sampling was used to select the academic law libraries and respondents who possessed relevant knowledge of library operations and ICT-related activities. Stratified sampling technique was used to categorize respondents into professional librarians, paraprofessional staff, library administrators, and ICT personnel to ensure adequate representation of all relevant groups within the study population.

Instrument for Data Collection

Data for the study were collected using structured questionnaires and interview guides. The questionnaire was designed to obtain quantitative data on the areas of blockchain application, opportunities, challenges, and adoption readiness in law library operations. The interview guide was used to collect qualitative data from library administrators and ICT personnel regarding institutional readiness, technological challenges, and implementation prospects of blockchain technology in academic law libraries.

Validity and Reliability of the Instrument

The instruments were subjected to face and content validity by experts in Library and Information Science and Information Technology to ensure clarity, relevance, and adequacy of the research items. Reliability of the questionnaire was determined using Cronbach's Alpha reliability coefficient to measure the internal consistency of the instrument. A reliability coefficient value of 0.70 and above was considered acceptable for the study.

Method of Data Analysis

Quantitative data obtained from the questionnaires were analyzed using descriptive and inferential statistical tools. Mean and standard deviation were used to answer the research questions, while regression analysis was employed to test the hypotheses at 0.05 level of significance. Statistical Package for Social Sciences (SPSS) was used for data analysis.

Qualitative data obtained from interviews were analyzed thematically and presented in narrative form to complement the quantitative findings.

The study focused primarily on librarians' perceptions, institutional readiness, and adoption factors relating to blockchain technology rather than practical system implementation or prototype development. Consequently,

the findings reflect conceptual and organizational readiness dimensions rather than technical feasibility assessment.

RESULTS AND DISCUSSION

Demographic Information of Respondents

This section presents the demographic characteristics of the respondents based on university, staff cadre, gender, educational qualification, and years of work experience. A total of 87 questionnaires were successfully completed and returned from the selected academic law libraries, representing the respondents used for the analysis.

Table 1**:** Distribution of Returned Questionnaires by University and Staff Cadre

S/N	University	Location	Librarians n (%)	Paraprofessionals n (%)	Total Returned n (%)
1	IBBU	Lapai	13 (72.2%)	5 (27.8%)	18 (20.7%)
2	UNIJOS	Jos	23 (33.3%)	46 (66.7%)	69 (79.3%)
Total			**36 (41.4%)**	**51 (58.6%)**	**87 (100%)**

Source: Field Survey, 2025

Table 1 shows the distribution of returned questionnaires by university and staff cadre in the selected academic law libraries. The findings reveal that 18 (20.7%) respondents were from Ibrahim Badamasi Babangida University, while 69 (79.3%) respondents were from University of Jos. The table further indicates that 36 (41.4%) of the respondents were professional librarians, whereas 51 (58.6%) were paraprofessional staff.

The implication of this finding is that both professional and paraprofessional staff participated actively in the study, thereby providing diverse perspectives regarding the application of blockchain technology in law library operations.

The higher number of respondents from the University of Jos may be attributed to the larger staff population within the institution's library system. The inclusion of respondents from different staff categories strengthens the reliability of the findings regarding opportunities, challenges, and adoption readiness for blockchain technology in academic law libraries.

Table 2: Distribution of Respondents by Staff Cadre

Staff Cadre	Frequency (n)	Percentage (%)
Librarians	36	41.4
Paraprofessionals	51	58.6
Total	**87**	**100**

Source: Field Survey, 2025

Table 2 shows that 36 (41.4%) of the respondents were professional librarians, while 51 (58.6%) were paraprofessional staff. This indicates that paraprofessional staff constituted the majority of the respondents in the selected academic law libraries.

Table 3: Distribution of Respondents by Gender

Gender	Frequency (n)	Percentage (%)
Male	49	56.3
Female	38	43.7
Total	**87**	**100**

Source: Field Survey, 2025

Table 3 reveals that 49 (56.3%) of the respondents were male, while 38 (43.7%) were female. This implies that male respondents constituted a slightly higher proportion of the study population.

Table 4: Distribution of Respondents by Educational Qualification

Qualification	Frequency (n)	Percentage (%)
Diploma	12	13.8
Bachelor's Degree	31	35.6
Master's Degree	37	42.5
PhD	7	8.1
Total	**87**	**100**

Source: Field Survey, 2025

Table 4 indicates that respondents with Master's Degrees constituted the highest proportion with 37 (42.5%), followed by Bachelor's Degree holders with 31 (35.6%). This suggests that most respondents possessed adequate academic qualifications relevant to library and information services.

Table 5: Distribution of Respondents by Years of Work Experience

Years of Experience	Frequency (n)	Percentage (%)
1–5 years	18	20.7
6–10 years	29	33.3
11–15 years	24	27.6
16 years and above	16	18.4
Total	**87**	**100**

Source: Field Survey, 2025

Table 5 shows that respondents with 6–10 years of work experience constituted the majority with 29 (33.3%), followed by those with 11–15 years of experience representing 24 (27.6%). This indicates that most respondents had substantial professional experience and were capable of providing informed responses regarding blockchain technology adoption in law library operations.

Research Question Analysis

Research Question One

In what areas of law library operations can blockchain technology be applied in selected academic law libraries in North-Central Nigeria?

Table 6: Areas of Application of Blockchain Technology in Law Library Operations

S/N	Items	Mean	Std. Dev.	Decision
1	Blockchain technology can be applied in cataloguing operations	3.41	0.72	Agree
2	Blockchain technology can improve circulation services	3.36	0.81	Agree
3	Blockchain technology can enhance digital archiving and preservation	3.58	0.65	Agree
4	Blockchain technology can support copyright management	3.49	0.74	Agree
5	Blockchain technology can improve authentication of legal documents	3.62	0.60	Agree
6	Blockchain technology can enhance institutional repository management	3.45	0.77	Agree
	Grand Mean	**3.49**		**Agree**

Decision Rule: Mean score of 2.50 and above = Agree

Source: Field Survey, 2025

Table 6 shows that respondents agreed that blockchain technology can be applied in several areas of law library operations including cataloguing, circulation services, digital archiving, copyright management, authentication of legal documents, and institutional repository management. The highest mean score of 3.62 was recorded for authentication of legal documents, indicating that respondents perceived blockchain technology as highly relevant for improving the security and authenticity of legal information resources in academic law libraries.

Research Question Two

What opportunities are associated with the application of blockchain technology in law library operations?

Table 7: Opportunities Associated with Blockchain Technology in Law Library Operations

S/N	Items	Mean	Std. Dev.	Decision
1	Blockchain technology enhances information security	3.67	0.58	Agree
2	Blockchain technology promotes transparency in library operations	3.54	0.69	Agree
3	Blockchain technology improves digital preservation of legal resources	3.61	0.63	Agree
4	Blockchain technology reduces data manipulation and unauthorized access	3.59	0.71	Agree
5	Blockchain technology supports efficient resource sharing	3.43	0.80	Agree
	Grand Mean	**3.57**		**Agree**

Decision Rule: Mean score of 2.50 and above = Agree

Source: Field Survey, 2025

The findings in Table 7 reveal that respondents agreed that blockchain technology offers several opportunities for law library operations. Respondents strongly agreed that blockchain technology enhances information security and improves digital preservation of legal resources. This suggests that blockchain technology is perceived as an important innovation capable of improving efficiency, transparency, and accountability in academic law libraries.

Research Question Three

What challenges affect the adoption of blockchain technology in academic law libraries?

Table 8: Challenges Affecting Blockchain Technology Adoption in Academic Law Libraries

S/N	Items	Mean	Std. Dev.	Decision
1	Inadequate ICT infrastructure affects blockchain adoption	3.71	0.56	Agree
2	Poor funding limits blockchain implementation	3.68	0.61	Agree
3	Lack of technical expertise affects adoption	3.60	0.67	Agree
4	Erratic power supply hinders blockchain implementation	3.55	0.79	Agree
5	Lack of institutional support affects adoption readiness	3.47	0.73	Agree
	Grand Mean	**3.60**		**Agree**

Decision Rule: Mean score of 2.50 and above = Agree

Source: Field Survey, 2025

Table 8 indicates that respondents agreed that inadequate ICT infrastructure, poor funding, lack of technical expertise, erratic power supply, and insufficient institutional support are major challenges affecting blockchain technology adoption in academic law libraries. The highest mean score of 3.71 was recorded for inadequate ICT infrastructure, suggesting that infrastructural limitations remain the most significant barrier to blockchain implementation.

Research Question Four

What is the level of adoption readiness of academic law libraries toward blockchain technology implementation?

Table 9: Adoption Readiness toward Blockchain Technology Implementation

S/N	Items	Mean	Std. Dev.	Decision
1	Librarians are aware of blockchain technology	3.32	0.82	Agree
2	Library staff possess basic ICT skills for blockchain adoption	3.18	0.87	Agree
3	Management supports technological innovation in libraries	3.09	0.91	Agree
4	Libraries are ready to invest in blockchain infrastructure	2.94	0.95	Agree
5	Staff are willing to undergo blockchain technology training	3.46	0.74	Agree
	Grand Mean	**3.20**		**Agree**

Decision Rule: Mean score of 2.50 and above = Agree

Source: Field Survey, 2025

The findings in Table 9 show that respondents generally agreed that academic law libraries demonstrate moderate readiness toward blockchain technology implementation. Staff willingness to undergo blockchain-related training recorded the highest mean score of 3.46, while readiness to invest in blockchain infrastructure recorded the lowest mean score of 2.94. This suggests that although awareness and willingness exist among library staff, infrastructural and financial readiness for implementation remain relatively moderate.

Hypothesis Testing

The hypotheses formulated for the study were tested at the 0.05 level of significance using simple linear regression analysis. The analyses were conducted using the Statistical Package for Social Sciences (SPSS) version 27.

Hypothesis One (H01)

H01

There is no significant relationship between ICT infrastructure and adoption readiness for blockchain technology in academic law libraries in North-Central Nigeria.

Table 10: Simple Linear Regression Analysis of ICT Infrastructure and Adoption Readiness

Predictor Variable	**β**	**t**	**p**
ICT Infrastructure	.642	6.518	< .001

Model Summary	**Value**
R	.642
R^2	.412
Adjusted R^2	.405
F	42.487

Note. Dependent variable = Adoption readiness for blockchain technology.

Source: Field Survey (2025).

The regression result presented in Table 10 indicates that ICT infrastructure significantly predicts adoption readiness for blockchain technology among academic law libraries in North-Central Nigeria, $\beta = .642$, $t(85) = 6.518$, $p < .001$. The model produced an R^2 value of .412, indicating that ICT infrastructure accounted for 41.2% of the variance in blockchain technology adoption readiness. The null hypothesis was therefore rejected. The finding implies that improved ICT infrastructure significantly enhances institutional readiness for blockchain technology implementation in academic law libraries.

Hypothesis Two (H02)

H02

There is no significant relationship between librarians' technological competence and blockchain technology adoption in academic law libraries in North-Central Nigeria.

Table 11: **Simple Linear Regression Analysis of Technological Competence and Blockchain Technology Adoption**

Predictor Variable	**β**	**t**	**p**
Technological Competence	.587	5.734	< .001

Model Summary	**Value**
R	.587
R^2	.344
Adjusted R^2	.337
F	32.875

Note. Dependent variable = Blockchain technology adoption.

Source: Field Survey (2025).

Table 11 shows that librarians' technological competence significantly predicts blockchain technology adoption in academic law libraries, $\beta = .587$, $t(85) = 5.734$, $p < .001$. The regression model yielded an R^2 value of .344, implying that technological competence explained 34.4% of the variation in blockchain technology adoption. Consequently, the null hypothesis was rejected. This finding suggests that librarians with higher technological competence are more likely to support and adopt blockchain technology in law library operations.

Hypothesis Three (H03)

H03

Institutional support does not significantly influence blockchain technology adoption in academic law libraries in North-Central Nigeria.

Table 12: **Simple Linear Regression Analysis of Institutional Support and Blockchain Technology Adoption**

Predictor Variable	**β**	**t**	**p**
Institutional Support	.611	6.103	< .001

Model Summary	**Value**
R	.611
R^2	.373
Adjusted R^2	.366
F	37.249

Note. Dependent variable = Blockchain technology adoption.

Source: Field Survey (2025).

The result in Table 12 reveals that institutional support significantly influences blockchain technology adoption in academic law libraries, $\beta = .611$, $t(85) = 6.103$, $p < .001$. The model explained 37.3% of the variance in blockchain technology adoption as indicated by the R^2 value of .373. Based on the result, the null hypothesis was rejected. The finding indicates that institutional support, including management commitment, funding, and policy support, plays a significant role in facilitating blockchain technology adoption in academic law libraries.

DISCUSSION OF FINDINGS

The findings of the study revealed that blockchain technology can be applied in several areas of law library operations including cataloguing, circulation services, digital archiving, copyright management, authentication of legal documents, and institutional repository management. Respondents particularly perceived blockchain technology as highly relevant for improving the authentication and security of legal information resources. This finding supports the position of Abid (2021), who observed that blockchain technology has the capacity to improve digital preservation, secure scholarly communication, and strengthen information management systems in libraries. The finding also aligns with the study of Sunday et al. (2023), which reported that blockchain technology could enhance transparency, accountability, and operational efficiency in library services.

The study further revealed that blockchain technology offers several opportunities for academic law libraries, particularly in enhancing information security, improving digital preservation, reducing unauthorized access, and promoting transparency in library operations. This finding is consistent with Yaga et al. (2019), who emphasized that blockchain technology enhances data integrity, traceability, and security through decentralized

digital ledger systems. Similarly, Haque and Rahman (2020) noted that blockchain technology provides secure and tamper-resistant platforms suitable for digital information management and preservation.

Findings from the study also showed that inadequate ICT infrastructure, poor funding, lack of technical expertise, erratic power supply, and insufficient institutional support constitute major challenges affecting blockchain technology adoption in academic law libraries. Inadequate ICT infrastructure emerged as the most significant challenge to adoption readiness. This finding corroborates the study of Fasola et al. (2024), which identified infrastructural deficiencies, insufficient funding, and limited technical competence as major barriers to blockchain technology adoption in Nigerian academic libraries. The finding also supports Onwubiko (2025), who observed that emerging technologies in libraries often face implementation challenges due to poor policy support and inadequate technological infrastructure.

The hypothesis testing revealed that ICT infrastructure significantly influences adoption readiness for blockchain technology in academic law libraries. This implies that institutions with stronger technological infrastructure are more likely to adopt blockchain technology successfully. The study also found that librarians' technological competence significantly predicts blockchain technology adoption, indicating that staff with adequate ICT skills and technological knowledge demonstrate higher readiness toward implementation. Furthermore, institutional support was found to significantly influence blockchain technology adoption, suggesting that management commitment, funding, and policy support are critical for successful integration of blockchain technology into law library operations.

Overall, the findings of the study demonstrate that although blockchain technology presents significant opportunities for improving law library operations, successful adoption depends largely on institutional readiness, infrastructural development, staff competence, and administrative support.

Critical Implications of Blockchain Adoption in Law Libraries

While the findings demonstrate strong perceived opportunities for blockchain integration in law library operations, practical implementation may face substantial technological and organizational constraints. Blockchain systems require considerable computational infrastructure, governance coordination, digital expertise, and financial investment, which may be difficult for many academic law libraries in developing countries. Issues relating to scalability, interoperability, energy consumption, regulatory compliance, and long-term maintenance remain important concerns in blockchain deployment.

Furthermore, the study observed that respondents expressed readiness toward blockchain adoption despite limited institutional technological capacity. This suggests that awareness and perceived usefulness may not necessarily translate into immediate implementation feasibility. In low-resource environments such as many Nigerian academic institutions, alternative digital security technologies including cloud-based authentication systems, centralized digital repositories, and encrypted institutional databases may still offer more cost-effective short-term solutions compared to full blockchain deployment.

Nevertheless, blockchain technology remains strategically relevant for sensitive legal information management because of its capacity to support tamper-resistant authentication, decentralized verification, and secure digital preservation of legal documents and institutional records.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study investigated the application of blockchain technology in law library operations in selected academic law libraries in North-Central Nigeria with emphasis on opportunities, challenges, and adoption readiness. The findings revealed that blockchain technology can be applied in key areas of law library operations such as cataloguing, circulation services, digital archiving, copyright management, institutional repository management, and authentication of legal information resources.

The study further established that blockchain technology offers significant opportunities for improving information security, digital preservation, transparency, accountability, and operational efficiency in academic law libraries. Despite these benefits, the findings showed that inadequate ICT infrastructure, poor funding, insufficient technical expertise, erratic power supply, and weak institutional support remain major barriers to blockchain technology adoption.

The study also revealed that ICT infrastructure, librarians' technological competence, and institutional support significantly influence blockchain technology adoption readiness in academic law libraries. The study therefore concludes that although academic law libraries in North-Central Nigeria demonstrate moderate awareness and readiness toward blockchain technology adoption, successful implementation depends largely on infrastructural development, staff competence, administrative commitment, and policy support. However, the study recognizes that blockchain implementation in academic law libraries requires substantial infrastructural investment, technical expertise, governance frameworks, and policy support before practical deployment can be achieved.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. Academic institutions should organize regular training programmes, workshops, and professional development initiatives to improve librarians' knowledge and technical competence in blockchain technology and other emerging digital technologies.

2. University management and library administrators should improve ICT infrastructure, internet connectivity, digital systems, and power supply to support effective implementation of blockchain technology in law library operations.

3. Government agencies and educational stakeholders should provide adequate funding and policy support for technological innovation and digital transformation in academic libraries.

4. Academic law libraries should develop institutional policies and strategic plans for the gradual integration of blockchain technology into cataloguing, digital preservation, and information security systems.

5. Collaboration between librarians, ICT professionals, and technology experts should be strengthened to facilitate effective implementation and management of blockchain-based library systems.

6. Academic law libraries should explore pilot blockchain projects focusing on legal document authentication, digital repository management, and copyright protection before large-scale implementation.

7. Future institutional initiatives should evaluate the comparative cost-effectiveness of blockchain systems relative to alternative digital security technologies suitable for low-resource academic environments.

Contribution to Knowledge

The originality of this study lies in its focus on blockchain technology application within academic law libraries, a relatively underexplored area in Library and Information Science research in Nigeria. The study contributes empirical evidence on adoption readiness, operational opportunities, and institutional challenges associated with blockchain technology in specialized legal information environments. The study also extends existing technology adoption literature by applying TAM and TOE perspectives within the context of law library operations.

Suggestions for Further Studies

Future studies should move beyond readiness assessment toward practical implementation and system feasibility analysis of blockchain technology in academic libraries. Subsequent research may develop prototype blockchain frameworks for legal document authentication, digital repository management, copyright protection, and interlibrary resource sharing systems.

Future researchers should also employ more advanced analytical techniques such as Structural Equation Modeling (SEM) to examine the interaction between technological, organizational, and environmental adoption factors. In addition, comparative studies involving multiple geopolitical zones, institutions, and alternative digital security technologies would provide broader empirical insights into blockchain adoption in low-resource academic environments.

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